Snow remote sensing at Finnish Environment Institute

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Remote sensing of snow has a long tradition at SYKE. Snow covered area (SCA) products have been produced since 2001 using AVHRR and later MODIS data [1]. The original coverage of Finland has been enlarged to contain also the Baltic countries. The SCA values are used by the WSFS (Watershed Forecasting System) to forecast the discharge of rivers during snow melt.

SCA has also been estimated from RADARSAT-1 data to complement the optical products using the method developed at Helsinki University of Technology. Recently, during spring 2009 snow water equivalent (SWE) products have been produced from AMSR-E microwave radiometer data together with weather station measurements [2].

Recent and on-going projects include GlobSnow, PolarView, SnowCarbo, and FloodFore, which are briefly described hereafter.

In Globsnow project (http://globsnow.fmi.fi) under ESA DUE program, SYKE contributes to development, validation and implementation of Snow extent mapping procedure employing optical sensors ERS/ATSR-2 and ENVISAT/AATSR, mainly concerning the boreal forest and tundra areas in Northern hemisphere. The result from processing (accomplished by Norwegian computer center eventually) will be 15 years harmonized data set showing the inter-annual and intra-annual evolution in snow extent.

PolarView (http://www.polarview.org) is an earth observation project, which has been running since 2005. Within the project an algorithm, developed at SYKE [1], has been implemented to a monitoring service of the fraction of snow covered area (SCA) in 5km x 5km grid covering most of the Baltic Sea drainage area.

SnowCarbo (http://snowcarbo.fmi.fi) is an EU Life+ project. The aim of the project is to develop a method for spatial carbon balance mapping by combining bio-physical modeling of terrestrial carbon exchange and remote sensing techniques providing input for the models. Special emphasis is given to the influence of seasonal snow cover on carbon exchange.

FloodFore (http://floodfore.fmi.fi) project develops an information system and techniques for improving flood forecasting by applying satellite observations, weather radars, and in situ measurements from automatic monitoring stations. The following physical characteristics relevant to flooding are included: SWE, amount and intensity of precipitation, SCA, soil moisture and soil frost. The project demonstrates the feasibility of the use of multisource information in a pilot experiment for Finnish Lapland using the hydrological forecasting system of SYKE. Using the new system, performance of hydrological model forecasts should improve.

References

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